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| 09/892,144 | 06/26/2001 | Robert J. Schroeder | 60.1413 | 2201 |

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Intellectual Property Department
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| EXAMINER | |
|---|---|
| LEE, JOHN D | |
| **ART UNIT** | **PAPER NUMBER** |
| 2874 | |

DATE MAILED: 12/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/892,144 | SCHROEDER, ROBERT J. | |
| | Examiner | Art Unit | |
| | John D. Lee | 2874 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 October 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

This Office action is responsive to applicant's communication submitted on October 24, 2003. Claims 1-27 are presently pending.

Claims 12, 18, 20, and 24 are objected to because of the following minor informalities: in claim 12, line 2, "a" should be "an"; in claim 18, line 6, "the fiber optic" should be "the optical fiber"; in claim 20, line 7, "the fiber optic and non-fiber optic sensors" should actually be "the optical and non-optical sensors"; in claim 20, line 8, "e)" should be "d)"; and in claim 24, line 1, "the non-fiber optic sensor" should actually be "the non-optical sensor". Appropriate correction is required.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication 2002/0119271 A1 to Quigley et al. Refer to the appropriate drawings or parts of the specification. Quigley et al discloses a composite spoolable tube with sensor that discloses all the limitations of the above-mentioned claims. Regarding claim 1, Quigley et al

discloses a sensor telemetry system ("Summary of Invention" and figures 21-23) comprising: at least one optical sensor (paragraph 22, line 4); at least one non-optical sensor; an optical fiber coupled (paragraph 28, lines 3 and 4) with the optical sensor and the non-optical sensor and being arranged to carry signals outputted from the optical sensor and the non-optical sensor. Quigley et al further discloses that the optical sensor is an intrinsic fiber optic sensor (paragraph 21, line 3), more specifically a Bragg grating (paragraph 23, line 6), as explained in claims 2 and 3. As to claim 4, Quigley et al discloses that the optical sensor comprises one of the sensor types enumerated in the claim (paragraph 22). Quigley et al still further discloses that the non-optical sensor comprises one of the sensor types enumerated in claim 5 (paragraphs 22 and 24).

Claims 6-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication 2002/0119271 A1 to Quigley et al. Refer to the appropriate drawings or parts of the specification. Quigley et al, as explained above, discloses essentially all the limitations of the claimed invention. Quigley et al discloses a detector (fig. 22, **100**) coupled to the optical fiber **(70)** at the surface of the oilfield, which is further coupled to an optoelectronic device (fig. 23, **86**) and wherein a source (**98**) is optically coupled (**96**) to the fiber, as described in claims 9-11, 18, and 19. Regarding part of claim 12, as well as claim 13, Quigley et al discloses that the telemetry system is used as an oilfield monitoring system (paragraph 14) deployed in an oilfield, wherein the borehole (fig. 20) traverses the oilfield. However, the reference does not explicitly disclose a converter coupled to the non-optical sensor.

On the other hand, one of ordinary skill in the art would have recognized that in order for a non-optical sensor to be coupled to an optical fiber properly, the non-optical signal would necessarily be converted into an optical signal for transmission on the optical medium. In

addition, electro-optic conversion devices (such as piezoelectric elements disclosed in the reference) are the most well known types of converters. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a converter to couple the non-optical sensors to the optical fiber, as explained in claims 6, 7, 17, and 24.

Additionally, because the non-optical sensors would need to be coupled by a conversion element to the optical fiber, they would be located remotely from the optical fiber, as an inherent property of being coupled through the conversion element, as mentioned by claims 14 and 15.

With reference to claims 8 and 16, using a Bragg grating encircled by a coating (such as piezoelectric coating, see paragraph 71), is a well-known means of converting mechanical strain in a non-optical sensor to an optical signal for transmission. As to claims 25 and 27, Quigley et al's Bragg grating sensor(s) functions by modifying the source wavelength(s) according to the applied strain(s) (paragraph 159 and 160). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a Bragg grating and a coating (such as a piezoelectric element) as a means of converting the non-optical signal.

Although the reference does not explicitly state that the first and second optical signals are demodulated, as mentioned in claim 20, Quigley et al shows a signal processing unit at the surface of the oilfield for receiving the optical signals (fig. 23, **86**). In order to derive the geophysical information from the optical signal, the signal processing unit would have to demodulate and/or demultiplex the two sets of optical signals from the optical and non-optical sensors (claim 26). Additionally, wavelength-, frequency-, and time-division multiplexing (claims 21-23) are well known means for modulating information onto an optical signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the

invention that the device disclosed by Quigley et al would need to demodulate the optical signal, in the time, frequency, or wavelength domain, in order to derive information about the physical parameters being sensed.

Applicant's arguments filed on October 24, 2003, have been fully considered but they are not deemed to be persuasive. Applicant argues that Quigley et al does not anticipate or make obvious the presently claimed invention because there is no motivation or suggestion in the reference to use a **common** telemetry to transmit signals outputted from **different** sensors responding to **different** environmental effects (emphasis by applicant). The Examiner strongly disagrees. The third part of this tripartite argument (**different** environmental effects) is moot because the claims of the present application do not require same. Notice that the only claiming of environmental effects are in claim lists such as claims 4 and 5, and even in these lists the same environmental effect (e.g. pressure) can be sensed by both the optical sensor and the non-optical sensor. The argument is thus reduced to alleging that Quigley et al does not disclose or suggest the use of a **common** telemetry to transmit signals outputted from **different** sensors. The Examiner believes that Quigley et al does, indeed, suggest the use of a **common** telemetry to transmit signals outputted from **different** sensors. At many places throughout the document, Quigley et al clearly describes such an arrangement: see paragraph **[0026]** for example, wherein Quigley et al states that "[the] first sensor and any additional sensors can be distributed along the length of a single energy conductor". It is clear that these "first sensor and any additional sensors" can be any combination of the optical sensors (described, for example, in paragraph **[0023]**) and the non-optical sensors (described, for example, in paragraph **[0024]**). The rejections (above) have clearly explained how the non-optical sensors convert to optical

information for transmission. The logical conclusion, then, as set forth in the rejections above, is that Quigley et al suggests embodiments of the sensor arrangement which include the use of a **common** telemetry (optical fiber) to transmit signals outputted from **different** sensors (optical sensors and non-optical sensors). Applicant's argument is thus not persuasive and the rejections are maintained.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 4,459,044 to Alves ~~et al~~ describes an optical sensor coupled to an optical fiber, along with a non-optical sensor used to calibrate the optical sensor. U.S. Patent 4,743,752 to Olsen et al shows dual sensors (Figure 5) coupled to an optical fiber wherein the sensors can be optically or electrically driven (abstract). U.S. Patent 6,601,671 to Zhao et al shows another oilfield borehole plural optical fiber sensing arrangement.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR § 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and an advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR § 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (703) 308-4886. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956, to the technical support staff supervisor (Team 2) at telephone number (703) 308-3072, or to the Technology Center 2800 Customer Service Office at telephone number (703) 306-3329.

*John D. Lee*
*Primary Patent Examiner*
*Group Art Unit 2874*